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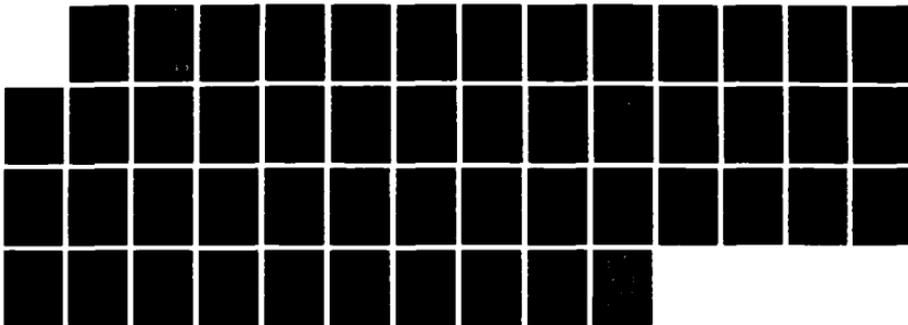
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Tactical Implications of the M2 Equipped, J-Series Mechanized Infantry
Battalion Dismount Strength

by

Major Frederic E. Abt
Infantry

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

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are next. Finally, conclusions concerning whether or not current structure supports doctrine are made from a comparison of current and past experience in light of U.S. tactical doctrine.

This study finds that doctrinally assigned missions which require speed and maneuverability of firepower to destroy an attacking or defending enemy are supported by the current battalion task force structure with its inherent low dismount strength. However, when either doctrine or leadership ignore the inherent manpower limitation found in mechanized forces and assign mission or develop plans requiring considerable manpower over an extended period of time, then current structure with the low dismount strength becomes a liability to successful tactical operation.

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ABSTRACT

TACTICAL IMPLICATIONS OF THE M2 EQUIPPED, J-SERIES MECHANIZED INFANTRY BATTALION DISMOUNT STRENGTH by MAJ Frederic E. Abt, USA, 42 pages.

Recently, there has been much speculation concerning whether or not the dismount strength inherent in the organizational structure of the M2-equipped, J-series mechanized infantry battalion task force is detrimental to the successful conduct of AirLand Battle tactical doctrine. This paper addresses the issue.

This study assesses the battalion task force structure as regards the missions U.S. tactical doctrine intends this unit to complete. The assessment examines current tactical doctrine for employment of the battalion task force. A review of past and foreign experience with mechanized operations examines how the issue of sufficient dismounted infantry to support tactical doctrine has been addressed. Experiences of serving officers in the execution of U.S. tactical doctrine with the current battalion task force structure in Europe and at the National Training Center are next. Finally, conclusions concerning whether or not current structure supports doctrine are made from a comparison of current and past experience in light of U.S. tactical doctrine.

This study finds that doctrinally assigned missions which require speed and maneuverability of firepower to destroy an attacking or defending enemy are supported by the current battalion task force structure with its inherent low dismount strength. However, when either doctrine or leadership ignore the inherent manpower limitation found in mechanized forces and assign missions or develop plans requiring considerable manpower over an extended period of time, then current structure with the low dismount strength becomes a liability to successful tactical operation.

Table of Contents

| | Page |
|--|------|
| I. Introduction..... | 1 |
| II. Doctrine..... | 3 |
| III. Historical Experience..... | 7 |
| Map: Israeli Avenues of Attack, Lebanon, 1982..... | 15 |
| IV. Current Experience..... | 17 |
| V. Comparison: Historical & Current..... | 23 |
| VI. Conclusions..... | 27 |
| Annex A. Capabilities Of The Battalion Task Force..... | 30 |
| Endnotes..... | 31 |
| Bibliography..... | 37 |

INTRODUCTION

The U.S. Army concentrates on developing tactical proficiency in its leaders, its soldiers, and its organizations. It is expected that this tactical proficiency will lay the groundwork for operational success in accordance with the Clausewitzian theoretical proposition that tactical success is a prerequisite for operational success. A recent article published in Armed Forces Journal International indicates the possibility of a flaw in the tactical structure of U.S. mechanized forces which would make them ineffective in combat. It would follow that this tactical ineffectiveness would lead to operational failure. The former commander of the 2d Armored Division, MG Richard Scholtes, questioned his division's effectiveness in combat due to the low dismount strength of its company and battalion level combined arms organizations.¹

Success at the brigade and division level is dependent in large part upon the combat power generated by the ten battalion task forces in the hands of the three brigade commanders, just as corps and army groups are dependent upon the ability of the maneuver divisions to accomplish their assigned missions. Consequently, an inherent weakness in the structure of the battalion task force which significantly reduces the combat power of the maneuver battalions would decrease the likelihood of operational success.

U.S. combined arms tactical doctrine is articulated in FM 100-5, Operations. To execute this combined arms doctrine successfully, tactical leaders must be given an appropriate mix of combat, combat support, and combat service support elements. Each element compensates for a shortcoming or a weakness in another and contributes a necessary

strength with the desired end of an effective combat organization with which to accomplish assigned missions. Tactical success of combined arms doctrine in the 20th century has been dependent upon an appropriate mix of combat organizations, primarily infantry on the ground, armored fighting vehicles in a variety of roles, combat support organizations, and combat service support organizations to execute successfully missions derived from, and supportive of this combined arms doctrine.

Currently, J-series mechanized battalions dismount 216 soldiers exclusive of platoon and company command and control elements. This sounds like a considerable number of fighters until the battalion is task organized. Depending upon the organization of the task force, the number of dismounted infantry available to the commander varies from 54 soldiers to 162 soldiers out of an organization with a strength ranging from about 655 soldiers to 797 soldiers. This becomes significant when the three areas we are likely to be employed, Central Europe, Southwest Asia, and Korea are more than 50% close terrain. Does the structure of the M2 equipped, J-series mechanized infantry battalion with its low dismount strength support U.S. combined arms tactical doctrine or is this low dismount strength a serious flaw rendering U.S. mechanized forces tactically ineffective?

FC 71-2J, The Tank and Mechanized Infantry Battalion Task Force and FM 100-5, Operations describe the doctrinal tasks of the M2 equipped, J-series mechanized infantry battalion. This paper addresses the issue of whether or not the M2 equipped battalion has sufficient dismounted infantry to fulfill these tasks. The paper is divided into five parts. Part One defines the mission of the battalion task force within the context of

AirLand Battle doctrine, identifies the capabilities necessary to accomplish this mission, and describes current U.S. Army tactical doctrine for employment of the J-series, M2 equipped battalion task force. In the light of these requirements, the paper then reviews the structure of the battalion task force which implements this doctrine. Part Two relates the experiences of foreign mechanized forces and U.S. mechanized forces of WWII and the Korean War as they addressed the issue of sufficient dismounted infantry to support tactical doctrine. Part Three relates experiences of serving officers in the execution of tactical doctrine with the current battalion organizational structure in the United States and in Europe. Part Four compares current and past experience in the conduct of mechanized tactical operations. Finally, Part Five draws conclusions about whether or not the current structure of the M2 equipped, J-series mechanized infantry battalion supports U.S. combined arms tactical doctrine.

Throughout this paper, the J-series, M2 equipped battalion task force will be noted simply as the battalion task force or task force. The terms mechanized infantry and armored infantry are used interchangeably. The task force refers to a balanced task force consisting of two mechanized infantry companies and two armor companies. The headquarters can be either mechanized or armor. All strengths reflect 100% manning unless otherwise stated.

PART I-DOCTRINE

AirLand Battle doctrine for the employment of forces at the

task force level is described in FM 71-20, The Tank and Mechanized Infantry Battalion Task Force. This doctrine addresses defense, offense, movement, and other tactical operations to include: passage of lines, relief in place, breakout from encirclement, linkup operations, hasty water crossings, and guard operations.

AirLand Battle tactical defensive operations take place on a non-linear battlefield. The entire depth of the battlefield is used to destroy the enemy. Battle positions, strongpoints and engagement areas reinforced with mines and obstacles are employed to shape the battlefield and breakup enemy formations into smaller elements which then can be defeated in detail by fires or counterattacks. The M2 provides long range anti-tank support in the defense to free the tanks for use in a counterattack role. M2's and dismounted infantry fight separately, but cooperatively, maximizing the capabilities of the dismounted infantry and the M2's long range 25mm chain gun and TOW anti-tank missile direct fires.

The offense is characterized by extensive reconnaissance prior to the attack and the use of infiltrating forces to disrupt the enemy's defense. Attacking forces use mass, speed, and violence at the point of decision to overwhelm and destroy the enemy. If possible, enemy forces are fixed and bypassed to maintain the momentum of the attack. If the enemy force must be destroyed or a position must be taken, M2's provide long range supporting fires while dismounted infantry envelops the enemy and reduces the strongpoint or destroys the force. Tanks and M2s cannot conduct mounted frontal attacks against an alert, entrenched enemy force equipped with anti-tank weapons. Concentration of combat power upon a

point to penetrate the defense is stressed as is the need to task organize effectively based upon the condition of the defender. Once the defense has been reduced, tanks assault through the objective to continue the attack or assume an overwatch role for other advancing forces. If it is necessary to secure an objective, dismounted infantry clear up pockets of resistance.

During movement the increased firepower of the M2 enhances the capability of the battalion task force to destroy an impeding enemy by fire, allowing the tanks to maneuver. Preferably, enemy forces are fixed and bypassed to maintain the momentum of the movement.

The tank and mechanized infantry battalion task force is organized for combat for the specific purpose of destroying enemy forces and their unit and deployment integrity by mounted combat or by a combination of mounted and dismounted combat.² This purpose exists within the framework of AirLand Battle doctrine. AirLand Battle is an offensively oriented doctrine. The 1986 FM 100-5 states that the generation of combat power at the tactical level is based upon securing and retaining the initiative and exercising this initiative aggressively to accomplish the mission. This initiative is defined as setting or changing the terms of battle by action and carries the implication of an offensive spirit in the conduct of all operations.³ Therefore, the structure of the battalion task force must lend itself to offensively oriented mounted and dismounted combat to destroy enemy forces. This purpose and offensive orientation is reflected in the mission of the battalion task force: to close with and destroy enemy forces, using fire, movement and shock effect in coordination with other arms.⁴

To meet this purpose and achieve the mission for which it was designed there are several capabilities which the organization must possess (see Annex A).⁵

The current four company battalion task force structure is designed for quick maneuver.⁶ The M2 was adopted to support this quick maneuver and to provide the infantry increased speed, mobility, and firepower. The presence of the M2 in the inventory enhances the battalion/task force commander's ability to seize and retain the initiative in support of mission accomplishment.⁷ A balanced battalion task force with two mechanized companies has 24 M2's organized into six platoons and a dismount strength of 108 soldiers. This does not include the company commander's M2, nor the M2's of the battalion commander and battalion operations officer in a mechanized task force.⁸

The battalion task force structure must support the commander in the application of available resources to their best effect. Resources available to the commander have been divided into combat, combat support and combat service support elements. The combat elements of the battalion task force are infantry and tanks. Infantry has traditionally been most effective in limited visibility, where observation and fields of fire are limited, and in close combat with the enemy. Tanks are most effective where they can move fast and provide rapid, accurate direct fire. FM 71-20 states that the introduction of the M2 has given the infantry the same general capabilities as those of tanks.⁹ Tactical doctrine¹⁰ accounts for this dichotomy by dividing the infantry squad into a carrier team which fights the M2 and a dismounted element, the rifle team, which digs in, patrols, infiltrates, reduce strongpoints and obstacles, fights in close terrain, and protects the tanks and IFVs. This

organization within the M2 squad creates a tension in the role of the carrier team which is to provide a base of fire with the 25mm chain gun for the rifle team in close combat, or position itself where it can best utilize its TOW long range anti-tank systems and 25mm chain gun against enemy tanks and infantry fighting vehicles (IFV).¹¹ These roles can be mutually exclusive. Cross attachment of tanks in the battalion task force still provides tank killing systems when the M2 is providing a base of fire for the rifle team, but there is no backup for rifle team close support when the M2 is carrying out its anti-tank role.

This is the structure with which the battalion task force commander is equipped to carry out the mission of the battalion task force in support of AirLand Battle tactical doctrine.

PART 2-HISTORICAL EXPERIENCE

U.S. tactical doctrine and the structure developed to implement this doctrine reflects past U.S. experience with mechanized forces as well as the training and combat experiences of foreign mechanized armies. Mechanized forces of the Federal Republic of Germany, the Soviet Union and Israel have had a significant impact upon U.S. doctrine and organizations.¹² The issue of infantry structure to support tactical doctrine existed in past conflicts and remains a controversial topic within the armies of these three countries. How these armies have met this issue in the past and how they address it today serves as a sounding board to compare and contrast current U.S. experience with the battalion task force.

The German Experience.

The success of the 1940 attack through France led Hitler to double the number of Panzer divisions in the Wehrmacht. In order to accomplish this before the invasion of Russia it was necessary to reduce the number of tanks by half and double the number of infantry regiments. Panzer divisions were restructured from a balanced force of one armor regiment and one armored infantry regiment to that of two armored infantry regiments and one armor regiment.¹³ Although the increase in armored infantry was the result of an inability of the Reich to produce tanks rather than a decision based upon tactical experience,¹⁴ subsequent combat, both offensive and defensive, on the Eastern Front proved the tactical utility of this restructuring. The Wehrmacht soon discovered that covering and dominating an area by fire was inadequate; it was necessary to capture the area and occupy it with infantry as well to defeat the Russians.¹⁵

As the surprise of the initial German attacks wore off, Russian units fought an increasingly tenacious defense. This stiffening of resistance uncovered the Wehrmacht's numerical weakness in mobile infantry which could accompany the tanks to reduce strongpoints and obstacles to movement.

Armored infantry moving with the tanks were to scout for and if possible destroy mines and obstacles to movement. This effort would be followed up by the foot infantry who would then carry out the crucial mop-up operations.¹⁶ Armored infantry squads could place eight men on the ground to accomplish their tasks in support of the tanks while the foot infantry could put ten men on the ground to mop-up.¹⁷ However, by late 1941 the increase in Russian anti-tank weaponry and the shortage of

armored vehicles to carry infantry necessary for the clearance of obstacles had reduced the speed of the Panzer columns from 25-30 km per day to 4-5 km per day, the speed of foot infantry in combat.

The few German battalions with armored vehicles operating in close coordination with the tanks proved themselves to be very effective and invaluable to tactical success; however, they were never numerous enough to achieve the successes of the opening days of the war.¹⁸

The German rifle company commander had the responsibility to field assault elements in the offense and conduct patrolling in the defense. From combat experience the Germans determined that a nine to ten man squad could effectively conduct a reconnaissance patrol and provide a strong assault detachment in the offense. This number also allowed for attrition resulting from continuous operations. A considerable drop in the striking power of a company was perceived when the strength of the rifle squads dropped to five or six men. With this criterion, the nine to ten man authorized strength of Wehrmacht infantry squads could sustain three to four casualties per squad and remain combat effective.¹⁹

As the war progressed the Wehrmacht was unable to field the manpower necessary to maintain effective strength levels within the Panzergranadier and standard infantry regiments. This led to a decrease in company and regimental effectiveness. The Russians took advantage of this weakness by constantly infiltrating dismounted infantry into the depleted German lines, destroying tanks and overrunning the positions. Russian infiltration was a problem which the Wehrmacht proved unable to solve throughout the war.²⁰

The descendant of the Wehrmacht, today's Bundeswehr, is an infantry

poor organization. The Panzer and Panzergranadier brigades are equipped with mechanized infantry fighting vehicles (MICV) which dismount six soldiers to carry out dismounted tasks while the MICV is positioned to make maximum use of the MILAN medium range anti-tank system and 20mm cannon against enemy tanks and lightly armored vehicles.²¹ This lack of infantry results not from ignorance of combat in World War II, but rather from decisions made when the Bundeswehr was created in the early '50's.

The Germans then envisioned themselves as creating the offensive striking arm of NATO and proceeded to develop and field a highly mechanized force for this purpose. This force was never intended to fight in close or urban terrain favorable to an infantry heavy force. The 40% to 50% of the Federal Republic which is restrictive terrain favorable for infantry was to be defended by the other NATO armies which were primarily infantry.²² Since that time, NATO forces have mechanized and the number of infantrymen to defend close or urban terrain has been reduced considerably, causing a dilemma for the infantry-poor Bundeswehr where this lack of infantry within the Panzergranadier battalion is a current topic of debate. The inclusion of light infantry regiments within selected mechanized divisions has been suggested as a means of compensating for this apparent shortcoming.²³

The Soviet Experience.

Soviet tactics and force structure reflect its combat experience against the Wehrmacht as well as against the Finns and the Japanese. At the outset of the 1939 Russo-Finnish War, attacks by massed infantry units of battalion size and larger were commonplace. The resultant slaughter led the Defense Commissar to revise current infantry

regulations. These revisions allowed for the reduction of enemy defensive positions by small detachments of eight to twelve man groups independently executing operations in the attack and establishing strongpoints in depth on the defense while under centralized control of the battalion. The structure of the infantry platoon reflected this shift in emphasis with the establishment of the nine man section. This decentralized execution and centralized control provided a means of acquiring mass when desired, while recognizing the lethality of modern weapons in the defense. Mass remained critical to the Soviet concept of combat. The revised infantry regulations stated that the ultimate method of annihilating the enemy was by massed attack.²⁴

Throughout World War II Red Army offensive tactics were based upon the successive reduction of enemy strongpoints. Defensively, the Soviets adopted General V.I. Chuikov's concept of an "active defense" based on a web of in-depth strongpoints backed by counterattacking storm groups. Chuikov designed this defense during the battle of Stalingrad to "hug" the Germans in close combat, negate the effectiveness of their air support, and break the momentum of the enemy attack. These storm groups consisted of an assault element, a reinforcing element and a reserve element. The assault element was composed of several section size subgroups armed with automatic weapons to provide intense suppressive fires while in the assault. This type of defense proved extremely effective against the Germans whose infantry strength during this period was reduced to about sixty men per company. These weakened companies proved inadequate to attack and secure strongpoints, then defend them against counterattacking storm groups.²⁵ It should be noted that the current dismount strength of the U.S. M2 equipped mechanized infantry company is 54 soldiers.

Contemporary Soviet combat organizations have combined the experience of WWII with modern technology. Extensive reconnaissance is conducted prior to an attack, usually by reinforced squads and platoons, to determine the best attack routes and the disposition of the defender. The National Training Center (NTC) opposing force (OPFOR) bases much of its success on the reconnaissance patrol effort. Its patrols usually consist of a three to four man squad plus a vehicle, generally a BMP although tanks have been used.²⁶ Attacking Soviet infantry organized into eight to ten man squads ride into battle aboard their infantry fighting vehicle, the BMP, dismount in the vicinity of the enemy defensive position and assault the position behind but remain within supporting distance of attached armor. Soviet artillery provides considerable indirect fire as the unit moves to the objective attempting to neutralize the defense before the assault is conducted. The BMPs follow the infantry providing suppressive direct fire for the attacking tanks and infantry. Reduction of a narrow section of the defensive line to allow the penetration of armor is the object of the combined arms motorized rifle attack. Deception is utilized to preclude reinforcement of vulnerable areas targeted for attack while strong defenses will be subjected to extremely intense indirect fires to neutralize the defense prior to the attack. Attacking Soviet units do not normally stop on the objective and consolidate; they continue the attack. In the defense, dismounted infantry fight within a strongpoint developed around the BMP to slow the momentum of the enemy's attack. A tank heavy reserve then counterattacks to complete the destruction of the enemy.²⁷

The Israeli Experience.

Contemporary German and Russian tactics and organizations reflect combat which ended forty-two years ago. Israeli tactics and

force structure reflect mechanized combat occurring in the 1973 Yom Kippur War and the incursions into Lebanon in the 1980's against opponents trained in Soviet tactics and equipped with Soviet weapons. Prior to the 1973 war, Israeli tactics and force structure focused on the employment of the tank to achieve a quick and relatively bloodless victory. The "conveyor belt" armor heavy column was the means created to achieve this end.²⁸ Tanks led and were followed by armored infantry to mop-up bypassed enemy units. In the Sinai, anti-tank guided missiles and hand held rocket propelled grenade fire defeated the armor heavy columns. In the Golan Heights, Syrian motorized infantry infiltrated Israeli defensive positions and held out against armor pure counterattacks. It was not until parachute infantry moving to combat in M113 armored personnel carriers cleared out the Egyptian and Syrian strongpoints that the tank units could begin the exploitations which ended the conflict.

The 1973 experience led to a refinement of combined arms tactics and the increased integration of infantry and armor down to the battalion level.²⁹ The best example of this integration is the 1977 fielding of the Merkava main battle tank. The Merkava's design includes a rear compartment with room for six to ten infantry depending upon the ammunition load of the tank.³⁰

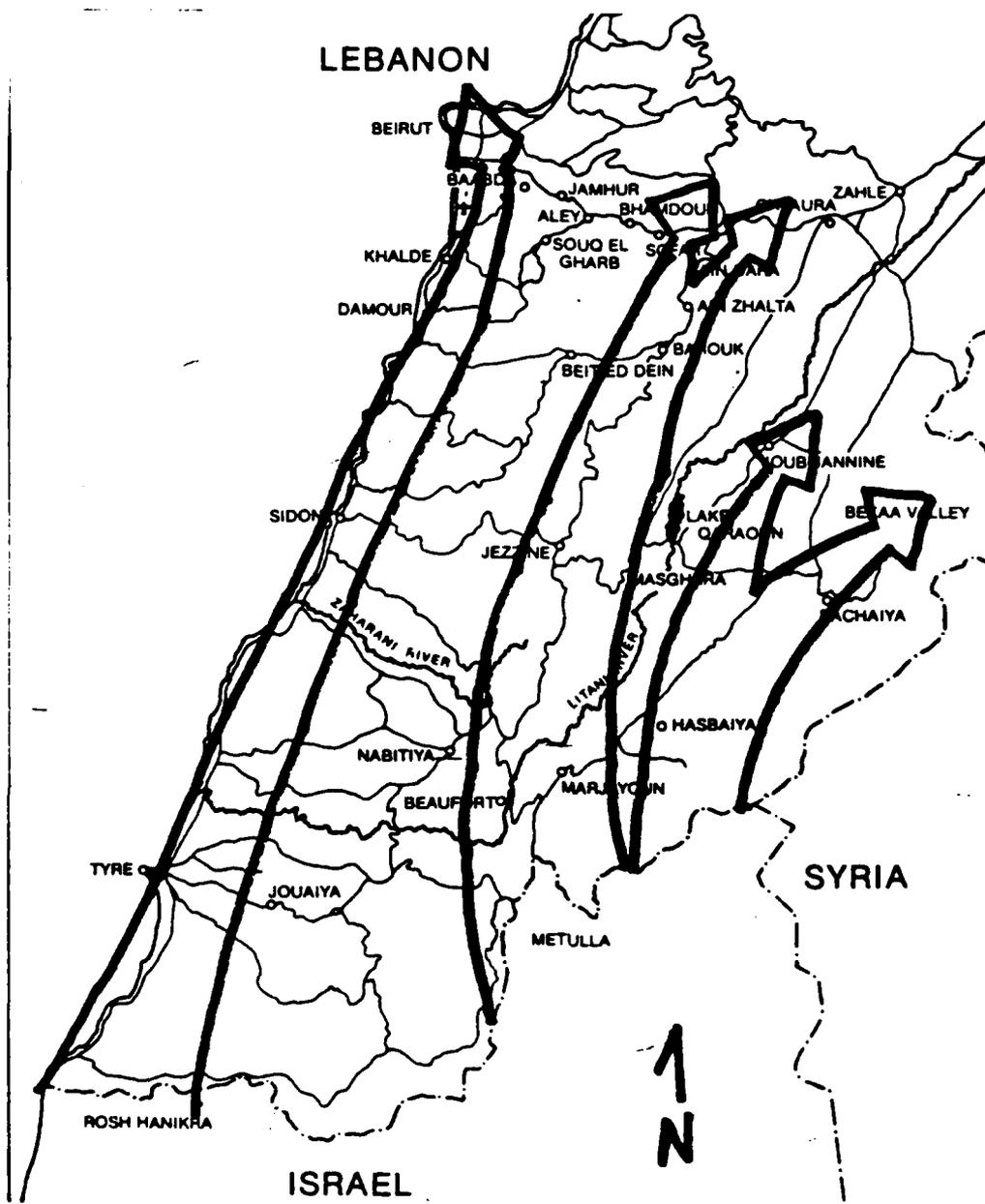
The reorganization of battalions into combined arms units, the continued equipping of armored infantry units with the M113, and the introduction of the Merkava gave Israeli mechanized forces the ability to employ adequate numbers of infantry, potentially about 100 close combat soldiers per tank heavy task force, in the attack and the defense.³¹ In the attack the immediate availability of infantry carried in the Merkava tanks

to reduce anti-tank strongpoints and assist in the recovery of tank crews from damaged tanks made the armor task force much more effective.

This is illustrated by the 1982 Israeli incursion into Lebanon. Israeli ground forces entered Lebanon along three axes, all three moving through difficult compartmented terrain (see map p. 15). One column chose to lead with armored infantry in Merkavas immediately followed by M113 mounted infantry. The other two columns advanced with tanks leading, armored infantry following at some greater distance not immediately available for support. The western column with armored infantry in close support made a slow but continuous advance up the coast toward Beirut. This advance was characterized by intense fighting to reduce a strongpoint defense in depth across a narrow front. The other two columns, facing the same sort of defense were delayed until reorganized in battle with the armored infantry up front where they could directly support the tanks in reducing anti-tank strongpoints. The eastern column had particular difficulty moving at night until armored infantry moved forward to clear out ambush sites. Once reorganized the columns were able to advance within artillery range of Damascus.³²

The U.S. Experience.

U.S. brigade level organization of mechanized forces during WWII recognized the utility of combined arms fighting. The combat commands of the armored divisions were designed to maintain a balance between armored infantry and tanks. The heavy combat command, usually combat command alpha (CCA), had a battalion plus a company of armored infantry as well as a battalion plus a company of tanks. This organization allowed CCA to put 360 close combat soldiers in support of the tank force. The other combat commands were smaller but similarly balanced.³³



Map illustrating the three avenues of attack used by Israeli forces during the 1982 operation "Peace For Galilee"

The combat command concept resulted from a 1939 review and restructuring of U.S. divisions by LTG Lesley J. McNair. In the course of this review, Army leaders determined that the eight man squad was too small to absorb casualties and continue action. As a result, regular infantry squads were given twelve men and armored infantry squads eleven.³⁴

An excellent example of an effective combined arms force in the attack is the penetration of CCA, 4th armored division during the Lorraine campaign. CCA was reinforced by the addition of 1st battalion, 319th Infantry Regiment, 80th Infantry Division (mounted in trucks). This gave CCA about seven companies of infantry to reduce obstacles to movement, and secure the tanks. This mix resulted in an advance of forty-five miles in a period of thirty-seven hours.³⁵ Three months later, during the Battle of the Bulge, a combat command from 7th armored division fighting in the densely wooded terrain was routed by an attacking German force of a tank regiment and a Panzer Grenadier regiment. Several factors led to the rout, however, General Ridgway fixed the blame on a lack of infantry to protect the tanks of the combat command from the infiltrating Panzer Grenadiers.³⁶

U.S. force structure remained unchanged throughout WWII. In 1947 another review determined that the twelve and eleven man infantry squads had proven too difficult for one man to control. This resulted in a nine man squad, including the squad leader.³⁷ Interestingly, the Marine Corps continued to field a large squad equivalent. Their sections had, and still have today, thirteen men. They solved the command and control problem by designating three team leaders each responsible for three soldiers, a squad leader in charge of the three team leaders.³⁸

The next test of U.S. arms occurred in Korea. Aside from the brief exploitation period following the landing at Inchon and the advance to the Yalu, Korean fighting was characterized by infantry battles over key terrain reminiscent of trench fighting in WWI. A critical aspect of this fighting was offensive and defensive patrolling. This patrolling was to gain information about enemy intentions and strongpoint locations while denying his patrols the same information and prevent enemy infiltration prior to an attack. The nine man squad, augmented from the weapons squad to a strength of eleven men, was considered very effective in combining strength and stealth to patrol behind enemy lines although six and seven man patrols were not uncommon. Chinese Communist patrols were also very effective and often consisted of as few as three men³⁹ Raids to seize prisoners required a much larger force. Usually the platoon with three rifle squads and a weapons squad would be given the mission.⁴⁰

Throughout the development of mechanized forces, combat organizations, both foreign and U.S., have reflected a preference for the nine to eleven man squad to account for attrition and enable the mounting of effective combat patrolling. In the offense, a balanced or armored infantry heavy mix focused upon a narrow front to gain and maintain momentum has been preferred when facing an organized defense equipped with effective anti-tank weaponry. In the defense, particularly in close terrain, a balanced or infantry heavy organization has been preferred to provide effective security for the tank element of the combined arms team.

PART 4-CURRENT EXPERIENCE

Today the U.S. army evaluates the effectiveness of its combat

structure through various training exercises, staff studies, and computer simulations. The size of the M2 squad was the subject of two Infantry School staff studies in 1978, while the impact of infantry in mechanized operations is the subject of an ongoing Infantry School test begun in 1987.⁴¹ The NTC has been training J-series task forces since 1984 while a similar operation has been established at the Hohenfels training area since 1986. These include both M113 and M2 equipped battalion task forces. A review of various studies, tests, and after action reports of force on force exercises make it possible to evaluate the effect of dismounted infantry upon the ability of the battalion task force to accomplish assigned offensive and defensive missions. The NTC and Hohenfels force on force experience adds the effect of continuous operations to the impact of dismounted infantry upon mission accomplishment. The effect of attrition upon dismounted infantry and mission accomplishment can only be judged from units which train with less than full strength squads.

Mechanized operations are designed to concentrate overwhelming combat power rapidly at an opponent's weak point. However, recent experience indicates that a failure to conduct effective reconnaissance and locate obstacles to movement, a failure to provide suppressive fires in support of breaching elements, and a lack of mechanical breaching assets such as rollers, plows, and line charges lead to a situation in which unsupported dismounted infantry and engineers must effect a breach. In these conditions, attrition and exhaustion from the physical effort necessary to clear an obstacle render the limited dismounted strength available to the battalion task force commander ineffective in

achieving the rapid offensive movement necessary to successful mechanized operations. This delay in movement increases the vulnerability of the battalion task force to opposing force anti-tank and indirect fires. Obstacles are the major impediment to successful mechanized offensive operations.⁴² Findings of a 1983 mission area analysis of combat in a NATO environment indicating that there will be a minimum of one minefield per 1.8 km, and one obstacle per km to impede movement highlight the criticality of successful obstacle reduction or avoidance.⁴³ The opposing force at the NTC and Hohenfels routinely cover their obstacles with direct and indirect fire. Because opposing force obstacles are covered with fire, any delay before an obstacle leads to considerable task force attrition. This attrition reduces the combat power available to the task force commander necessary for mission success. A rule of thumb for obstacle clearance at the NTC, assuming full strength squads, is the loss of the dismount strength from one mechanized infantry platoon per individual obstacle to effect a breach. The clearance of more complex obstacles requires up to a company of dismounted soldiers.⁴⁴

The attrition of available dismounted infantry in reducing obstacles to offensive movement reduces the number of dismounted infantry the battalion task force commander has to complete actions on the objective. The commander often finds his unit on the objective with insufficient dismounted infantry to clear out dug in opposing force infantry and prepare hasty defensive positions to repel the opposing force counterattack. This results in the task force continuing to lose vehicles to close range anti-tank fires and being overrun by the opposing force taking advantage of the task force's inability to quickly complete actions on the objective.⁴⁵

The loss of dismounted infantry in obstacle breaching and the adverse effect this loss has upon the ability of the battalion task force to conduct necessary actions upon the objective can be avoided or reduced if proper reconnaissance is conducted prior to offensive operations. More than anything else, the task force commander needs to know the location of enemy obstacles and the disposition of enemy forces if he is to capitalize upon the speed and maneuverability of mechanized operations and conserve his dismounted infantry for actions on the objective.⁴⁶ It is not enough to locate and report these obstacles and forces, they must be kept under constant surveillance to report any changes which may affect the battalion task force plan. Several reconnaissance patrols are necessary to accomplish this mission. The battalion task force scout platoon is often augmented with the dismount teams from a mechanized infantry company to get the requisite number of dismounted soldiers to conduct these patrols.⁴⁷ This reconnaissance effort must be continuous. Each offensive operation requires an intensive reconnaissance effort to achieve success. This continuous need for dismounted infantry increases the fatigue of the limited infantry available to the task force commander. The absence of enough infantry to conduct reconnaissance combined with the fatigue of those few available is a major factor contributing to a poor reconnaissance effort which fails to uncover the opposing force defensive plan. The opposing force defense must then be reduced by the same tired infantry who could not effectively carry out the critical reconnaissance effort.

Defensively, the battalion task force's limited dismounted infantry strength has an adverse effect upon its ability to conduct a successful counter-reconnaissance effort while simultaneously preparing to defend.

The NTC opposing force is very skillful at infiltrating men and vehicles into battalion task force positions along concealed routes to report on the defensive plan, direct indirect fires upon defensive positions, and destroy direct fire weapons systems. During a recent briefing by the NTC opposing force (OPFOR) division commander he stressed the ability of OPFOR infantry to tear apart "blue" (training) units.

Too often, a defense is unhinged well before the regimental main body has made contact.⁴⁸

Patrolling requirements for the defensive counter-reconnaissance effort to prevent OPFOR infiltration are just as personnel intensive as they are for the offensive reconnaissance effort. To this must be added dismounted personnel to guard emplaced obstacles as well as provide security within the battle position itself. Thermal sights on the M2 and M1 are forcing the OPFOR to become more cautious as they infiltrate; however, broken terrain still requires considerable dismounted infantry to cover possible infiltration routes.⁴⁹ All these security requirements must be accomplished while fighting positions, to include obstacles, are emplaced. This simultaneous conduct of critical defensive tasks requires more manpower than is available to the battalion task force commander.⁵⁰ The fatigue of continuous operations has the same adverse effect in the conduct of the defense as it does in the offense. Overall, success in the defense is degraded by the limited dismount strength of the battalion task force.

It should be noted that the OPFOR has a very limited dismounted capability. Despite this limitation, it has been extremely successful in defeating "blue" units. There are many factors which favor the OPFOR;

however, the key elements seem to be a firm understanding of Soviet tactical doctrine, an ability gained through practice, and a firm understanding of U.S. tactical doctrine with which the "blue" force fights. This knowledge and ability to execute allows the OPFOR to successfully pit their strengths against "blue" weaknesses.

Although the attrition of combat losses cannot be accurately portrayed at the NTC, units training at less than full strength provide some indication of the impact of attrition upon mission accomplishment. Units which chose to deploy to the NTC at less than full strength magnify the adverse impact of limited dismount strength and increase the probability of mission failure to the extent that NTC training loses its value to the unit.⁵¹ This highlights the inability of the battalion task force to sustain losses and still remain mission capable.

Two studies and a test report, "The Contribution of Infantry To Battle Test, Phase I," the "Report of the Special Study Group On The Infantry Fighting Vehicle And The Cavalry Fighting Vehicle," and "Study Results. Infantry Fighting Vehicle Task Force," verify the utility of dismounted infantry in the conduct of successful mechanized operations. The task force directed by MG Pat W. Crizer recommend an increase in the size of the mechanized infantry squad from nine to eleven in order to accomplish all the assigned missions which mechanized infantry must successfully perform.⁵² The IFV/CFV Special Study Group Report found that the nine man squad was marginally able to perform all assigned missions and that a loss of two soldiers would make the squad ineffective in accomplishing assigned missions.⁵³ The "Contribution of

Infantry To Battle Test" found that an increase in the number of dismounted infantry from eighteen to twenty-five increased the ability of the dismounted platoon to accomplish assigned missions.⁵⁴

Overall, Current NTC and German experience, test results, and study group reports indicate that the current dismount strength of the battalion task force has an adverse impact upon mission accomplishment in support of AirLand Battle tactical doctrine.

PART 4-COMPARISON: HISTORICAL & CURRENT

A comparison of mechanized tactical operations in the past with current operations presents similarities in execution which have contributed to success and failure in the conduct of the offense as well as the defense.

Generally, mechanized forces have been more effective on the offense when given a mission of destroying an opponent's force than when ordered to attack to secure and retain terrain. In the conduct of the offense, obstacle avoidance is the best means of reaching an objective with sufficient combat power to destroy an enemy force or seize terrain. To avoid obstacles, the mechanized force must first locate them and then find bypasses. The best means of locating obstacles and bypass routes without giving notice of intent to the defender is with dismounted reconnaissance patrols. The preferred size of a reconnaissance patrol preserving stealth and providing some measure of self-protection is between nine and eleven soldiers, although smaller patrols have also proven to be very effective. The number of patrols comprising the

reconnaissance effort is determined by the number of possible routes to be investigated. An ability to field several patrols allows the planner greater scope in the development of an operation; he will not be limited to one or two possible avenues of approach.

If obstacles cannot be avoided and mechanical breaching means are unavailable, the most effective means of breaching the obstacle regardless of type is with a dismounted infantry and engineer breaching element overwatched by direct fire systems providing suppressive fires. Obstacle breaching is manpower intensive and incurs a high cost in personnel attrition. The number of dismounted personnel necessary to insure the rapid unobstructed passage of the force is dependent upon the depth of the defense as well as its state of preparation.

Rapid movement throughout the battlefield cannot be achieved unless the mechanized force can avoid consolidating upon the objective or can quickly complete actions on the objective. Many successful approaches to an objective have been made only to have the operation fail as forces become bogged down on the objective. Generally, destruction of an enemy force which has not gone to ground is considerably easier. In this case the ability of the mechanized force to maneuver and the gunnery skills of the direct fire weapons crews determine the outcome. The presence of a dug in defender requires considerable dismounted infantry to penetrate the defensive position causing the defender either to move out of position where overwatching direct fires can destroy personnel and vehicles attempting to redeploy, or remain in position where suppressive fires protect the dismounted force as it clears the defender out of his fighting positions. Successful mechanized offensive operations against prepared

defenses are characterized by extensive artillery and air delivered fire to neutralize the defense at the point of attack. As the attacking mechanized force continues to cut into the depth of the defence, regular or mechanized infantry follow-on forces conduct actions on the objective. When the prepared defender has not been neutralized and/or mechanized forces have had to secure the objective, limitations in manpower slow or halt the momentum of the offensive operation. This decrease in offensive momentum gives the defender time to react and launch a counterattack while the attacking force is still fighting on or near the objective. It is incumbent upon the crews of the direct fire weapons systems to finish the initial engagement rapidly in order to prepare for subsequent engagements from any reserve or other counterattacking force. This threat of counterattack necessitates that the dismounted force, in addition to securing the objective, deploys along covered and concealed routes into the position providing protection and early warning against infiltrating forces.

Defensively, mechanized forces are better able to conduct a mobile defense in depth rather than a defense requiring retention of terrain. The probability of success in a defend to retain terrain mission is greater when mechanized forces act as a counterattacking force while regular infantry defends in position. When the mechanized force defends, its ability to defeat the enemy reconnaissance and infiltration effort has been a major factor in determining success or failure. The best means of countering this threat is with an extensive patrolling and guard operation. The defensive effort must be protected from infiltrating enemy attempting to discern the layout of the defense so obstacles and kill

zones can be avoided or positioning themselves in stay behind fighting positions to destroy defending direct and indirect fire weapons systems prior to or in coordination with the conduct of the attack. This threat internal to the defense necessitates that crews of direct fire weapons systems and critical transport assets must remain alert, close to their weapons system or vehicle, and capable of going into action immediately. The conduct of the security operation to counter this threat is manpower intensive based upon the number of possible avenues of approach into the position, the number of direct fire weapons systems which must be secured and the width and depth of the defensive sector.

At the same time that the critical counter-reconnaissance mission is taking place, the defensive sector or position is being prepared. This extremely manpower and material intensive mission is as important as counter-reconnaissance to a successful defense. The defending commander insures that crew-served weapons and individual fighting positions are dug in with overhead cover, tactical and obstructive wire is laid, mines with anti-handling devices are emplaced, fields of fire are prepared, obstacles to armored vehicles are emplaced, wired, mined and integrated into the unit fire plan. As with most manpower intensive tasks, time of preparation decreases as applied manpower increases. Overall, mechanized forces conducting a positional defense without additional infantry augmentation have proven to be extremely vulnerable due to a lack of dismounted infantry to adequately secure and prepare the position.

PART 5- CONCLUSIONS

The battalion task force structure emphasizes mounted speed and firepower complimented with a very limited and lightly armed dismounted strength. Historical experience and current U.S. tactical doctrine emphasize a need for the generation of effective direct fire which can be quickly maneuvered around the battlefield for success in the offense. The M1/M2 battalion equipped with the 120mm main gun, TOW missile system, 25mm chain gun, and coaxially mounted 7.62mm machine guns directed by extremely accurate thermal, stabilized target acquisition systems gives the task force commander the capability of placing massive suppressive fires upon a defending enemy or rapidly destroying exposed stationary and moving armored vehicles in virtually all conditions.

The complete mechanization of the task force with extremely fast, cross-country capable vehicles gives the commander the speed and maneuverability necessary to exploit temporary weaknesses in the enemy's defense and to place the firepower assets of the task force upon the opponent's vulnerable flanks and rear.

Historical experience and doctrine indicate the need for a dismount force capable of conducting the reconnaissance and obstacle reduction effort vital to tactical offensive success. The battalion task force commander is extremely limited by the organic dismount strength of the M2 equipped force to accomplish these missions. If tactical success is to be achieved, successful reconnaissance and obstacle reduction must take place in a zone extremely limited in width and depth. The size of the zone must be in inverse proportion to the preparedness of the defender.

This focus on a very limited point of the defense to effect a rupture is consistently found in the conduct of past successful mechanized operations and is espoused in current tactical doctrine.

Defensively, historical and current experience has proven mechanized forces very capable of conducting a mobile area defense focused upon force destruction, but extremely poor in the conduct of a defense requiring the securing or retention of terrain. This inability is due to the lack of manpower. The structure of the battalion task force, emphasizing speed and firepower, is admirably suited for the conduct of the mobile area defense but inadequate when the defense requires the security or retention of terrain. Current U.S. tactical doctrine emphasizes force destruction through the conduct of sector, battle position, and strongpoint defense. However, the sector defense oriented upon the enemy force is listed as the most common form of defense.

Overall, the answer to the question, "Does the current dismount strength of the M2 equipped, J-series mechanized infantry battalion support U.S. combined arms tactical doctrine?" is a qualified "Yes!" The qualification concerns doctrinal and leader recognition of the limitations inherent in mechanized forces and the reality of attrition in combat. When these limitations are recognized, the M2 equipped, J-series mechanized infantry battalion is an extremely valuable asset. However, when this recognition is not present or is ignored, the M2 equipped, J-series mechanized infantry battalion with its low dismount strength becomes a liability.

Generally, U.S. tactical doctrine reflects the limitations and capabilities which the lack of manpower and the increase in speed, maneuverability, and firepower give to the battalion task force. However,

doctrine still presents positional terrain oriented defense, in-depth obstacle reduction, strongpoint reduction, and combat in restricted terrain as viable missions for a mechanized force. These missions are antithetical to successful mechanized operations. These are missions suited for regular, manpower rather than weapon system intensive, infantry organizations. Additionally, doctrine and force structure do not adequately address the issue of continuous combat operations and the impact of attrition on force effectiveness in sustained combat. U.S. tactical doctrine and force structure must alleviate these shortcomings to increase the likelihood of tactical success.

This doctrinal recognition must be coupled with frequent, realistic intense training in order to realize the benefits of available speed and maneuverability while determining limits to execution and how to overcome these limits with available assets. The leadership of mechanized forces in the conduct of combined arms operations must recognize the capabilities and limitations inherent in mechanized operations and form plans which minimize the weaknesses and maximize the strengths of this extremely potent method of waging war.

Annex A. Capabilities Of The Battalion Task Force.⁵

- a. Conduct continuous operations, 24 hours a day.
- b. Move to contact independently, or as a part of a larger force
- c. Attack to seize, overrun, penetrate, or envelop prepared enemy defenses or strongpoints.
- d. Conduct exploitation and pursuit operations as part of a larger force
- e. Conduct reconnaissance in force, conduct raids.
- f. Defend from or attack villages, towns, and strip areas.
- g. Continue operations in all weather and visibility to include night operations.
- h. Operate in an NBC and EW environment.
- i. Defend or delay in sector.
- j. Operate as part of the covering force of a larger unit.
- k. Move rapidly in any direction to defend from battle positions.
- l. Conduct river-crossing operations.
- m. Conduct rear area combat operations.
- n. Defend from battalion or company size battle positions
- o. Conduct air assault operations.
- p. Conduct infiltration operations.

ENDNOTES

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2. U.S. Army, Field Manual 71-2J, The Tank And Mechanized Infantry Battalion Task Force, (Coordinating Draft), (Washington D.C., December 1984), p. vi.
3. U.S. Army, Field Manual 100-5, Operations, (Washington D.C., May 1986), p. 15.
4. FM 71-2J, p. 1-33.
5. Ibid. These capabilities are found in three publications: the table of organization and equipment document in the capabilities paragraph, The Army Training and Evaluation Program for Mechanized Infantry/Tank Task Force (ARTEP 71-2), and on page 1-33 of FM 71-2J. Those capabilities listed in FM 71-2J encompass those in the other two publications and are used in this paper.
6. U.S. Army Command And General Staff College, Student Text 101-1, Organizational And Tactical Reference Data For The Army In The Field, (Fort Leavenworth, KS, June 1987), pp. 8-23, 8-44. Much of the organic combat service support has been consolidated in the headquarters company (HHC) of the J-series battalion task force. The combat support company has been absorbed into the HHC while the heavy anti-tank systems (M901, Improved TOW Vehicle) in the mechanized infantry battalion have been organized into a separate company. This consolidation has resulted in an HHC with a strength of: 300 in the tank battalion task force, or 351 in the mechanized infantry battalion task force.
7. FM 71-2J, p. 1-20.
8. U.S. Army, Field Circular 71-1J, The Tank And Mechanized Infantry Company Team, (Coordinating Draft), (United States Army Armor School, Fort Knox, Kentucky, United States Army Infantry School, Fort Benning, Georgia, December 1985), pp. 1-9 thru 1-11. These 108 soldiers are the aggregate number of dismounted soldiers from the rifle teams of six mechanized infantry platoons.

9. FM 71-2J, p. 1-34.
10. U.S. Army, Field Manual 7-7J, The Mechanized Infantry Platoon And Squad (Bradley), (Washington D.C., February 1986), p. 2-4 ; FM 71-1J, p. 1-9.
11. FM 71-1J, pp. 1-9, 1-10.
12. General (retired) William E. DePuy, "The U.S. Army Are We Ready for the Future?", Army, (September 1979), p. 29.
13. Heinz Guderian, Panzer Leader, (New York: Ballantine Books, 1957), p. 114.
14. *Ibid.*, p. 115. Guderian was not even consulted concerning the reorganization of German armored forces.
15. Generalmajor Hellmuth Reinhardt, Infantry Organizations And Equipment Based On German Experiences In Russia, (Study #MS P-095, Office Of The Chief Of Military History, Washington D.C., July 1951), p. 15.
16. Bryan I. Fugate, Operation Barbarossa Strategy And Tactics On The Eastern Front, 1941, (Novato, CA: Presidio Press, 1984), p. 300.
17. U.S. War Department, Technical Manual E30-451, Handbook On German Military Forces. (Washington D.C., March 1945), pp. 11-37, 11-49. The armored infantry squad consisted of 1 NCO, 1 vehicle driver, and 7 privates. The motorized infantry squad had 1 NCO, 1 vehicle driver, and 8 privates. The standard infantry squad (foot) had 1 NCO and 9 privates.
18. Fugate, pp. 309-310 , Guderian, p.114. Although the armored infantry component of the panzer division was doubled between 1940 and 1941, the mobility of these units suffered from a lack of armored vehicles to carry the infantrymen.
19. Reinhardt, p.75.
20. Lieutenant Colonel John English, "New Doctrines For Infantry", (Xeroxed copy of speech to be published in 1987), p. 6.

21. Franz Uhle-Wettler, Battlefield Central Europe Danger Of Overreliance On Technology By The Armed Forces. (Fort Leavenworth, KS, December 1986), pp. 43-44.
22. English, p. 9 ; Uhle-Wettler, pp. 47-48.
23. English, p. 7 ; Uhle-Wettler, pp. 1-123 ; Gero Koch, "German Infantry In The 1990's", Infantry (July-August 1987), pp. 213-218.
24. Major John English, On Infantry. (New York: Praeger Publishers, 1981), p. 92.
25. *Ibid.*, pp. 104-107.
26. U.S. Army, Field Manual 100-2-1, The Soviet Army Operations And Tactics. (Washington D.C., 1984), pp. 7-2, 7-3 ; MAJ David J. Ozolek, "Reconnaissance Planning A Neglected Art", Infantry, (March-April 1986), pp. 27-31.
27. FM 100-2-1, pp. 6-7, 6-9 ; C.N. Donnelly, "Tactical Problems Facing The Soviet Army Recent Debates In the Soviet Military Press", International Defense Review, (1979), pp. 1406, 1407.
28. Edward Luttwak, Dan Horowitz, The Israeli Army. (New York: Harper and Row, 1975), pp. 363-370. "Conveyor Belt" tactics as developed by General Tal were designed to allow an armor spearhead to set the speed of an attack while slower and more vulnerable armored or motorized infantry followed to mop-up bypassed enemy positions. The pace of the infantry did not effect the pace of the tanks. The tank spearhead was continually replenished by a motorized logistical column pushing all classes of supply forward.
29. David Eshel, "Modern Inter-Arms Concept Of Organization: The Yom Kippur War And After", Defence Update International, (1985), pp. 32-41, Major General Chaim Herzog, The War Of Atonement. (Boston, MA. Little, Brown, and Company, 1975), pp. 270-271.

30. Richard Cornblum, "Israeli New Tank The Merkava", Canadian Defense Quarterly, (Autumn, 1979), p. 37; Richard A. Gabriel, Operation Peace For Galilee The Israeli-PLO War In Lebanon, (New York: Hill and Wang, 1984), pp.197-199; Gunther E. Rothenberg, The Anatomy Of The Israeli Army, (New York: Hippocrene Books, 1979), p. 219. According to Gabriel, the Merkava routinely carried ten infantrymen and in one instance twelve wounded men were evacuated inside a Merkava during combat in the Bekaa Valley.

31. Gabriel, p. 232. Given that Israel continues with its triangular combined arms structure, a heavy battalion may look like this: A tank, armored infantry mix of two tank companies (Merkava) and one armored infantry company. Each tank company deploys ten tanks; the armored infantry company deploys nine squad-carrying APCs, ten men to a squad. A six man dismount element in each Merkava, excluding the company commander's tank, and an eight man dismount element in each M113, will give 198 soldiers for close combat.

32. Eshel, pp. 39,58. The map and avenues of attack were taken from Gabriel, pp. 71, 75. The zone immediately along the coast from the Israeli border to Beirut constituted the Western Sector; the Central Sector extended from Marjayoun north through Jezzine up through the Shouf and out the Damascus-Beirut highway. The third zone, the Eastern Sector, extended through Hasbaiya toward Rachaiya east of Lake Qaraoun, striking through the center of the Bekaa Valley at Joub Jannine out toward Yanta.

33. Christopher R. Gabel, The Lorraine Campaign, (Fort Leavenworth, KS, February 1985), p. 13.

34. English, On Infantry, pp. 129-132.

35. Gabel, p. 17.

36. MAJ Gregory Fontenot, The Lucky Seventh In The Bulge: A Case Study For The Airland Battle. (Fort Leavenworth, Kansas), p. 110.

37. English, On Infantry, pp. 174,176.

38. Ibid., pp. 165,166,174.

39. Training Bulletin No.7,(Office Chief Of Army Field Forces,14 August 1952), p. 3.
40. Ibid., p. 10.
41. U.S. Army Combat Developments Experimentation Center, Contribution Of Infantry To Battle Test, Phase I, (CIBT I), (January 1987).
42. E.S. Leland Jr., BG, "NTC Observations", (20 November 1985), p. 14 ; LTC James R. McDonough, Interview Notes, 15 September 1987 ; LTC James response to questionnaire, October 1987 ; LTC Crowley, telephone interview, 28 September 1987 ; MAJ Allan Carroll, NTC Rotation 87-5 Observer Notes, January 1987 ; MAJ Thomas Piskel, response to questionnaire, November 1987 ; CPT Wallace, response to questionnaire, November 1987.
43. U.S. Army Engineer School, Presentation Slides, "Close Combat Heavy Breaching Concept", (Ft. Belvoir, VA). slide #OBCL10.
44. LTC McDonough, Interview 15, September 1987 ; MAJ Thomas Piskel, response to questionnaire, November 1987.
45. COL Timmerman, interview notes, 8 October 1987 ; MAJ Kenney, post-rotation 87-4 interview ; CPT Benedict, questionnaire response, November 1987
46. Leyland, p. 2 ; Combined Arms Training Activity Lessons Learned, (Ft. Leavenworth, KS),(31 January 1986), pp. 5,6 ; Lessons Learned, (1 May 1986), pp. 7,8.
47. Lessons Learned, (31 January 1986), p. 6 ; ; Lessons Learned, (27 February 1987), p. 2 ; Commander's Comments The CS Team, (Ft. Leavenworth, KS), (8 May 1987), p. 2 ; 4th Battalion, 68th Armor Regiment Playbook, "Night Attack, Sequence"
48. Leyland, p. 2 ; Ozolek, "Reconnaissance Planning A Neglected Art", pp. 27-31 ; Ozolek, Counterreconnaissance", Infantry, (September-October 1986), p. 34-37 , Lessons Learned, (1 May 1986), p. 1.

49. Comments by OPFOR Division Commander, briefing to FORSCOM Leader Training Program Group, 6 November 1987 ; CPT Charles D. Vance, Combined Arms Training Activity, NTC Observation #87-5-49, (Ft. Leavenworth, KS).

50. LTC McDonough interview ; MAJ William Marshall, response to questionnaire, November 1987 ; MAJ Walter Wojdakowski, response to questionnaire, November 1987 ; MAJ Witte, response to questionnaire, November 1987 ; CPT Wallace, response to questionnaire, November 1987.

51. MAJ C.T. Carrick (USAIS), Combined Arms Training Activity, NTC Observation #87-5-47 ; CPT Bill Moloney (USAIS), Combined Arms Training Activity , NTC Observation#87-5-46.

52. MG Pat W. Crizer, Director, Study Results, Infantry Fighting Vehicle Task Force, (Washington D.C., April 1978), pp. I-8, II-72.

53. Dr. Wilbur B. Payne, COL Reed E. Davis Jr., LTC (P) J. Lynn Flemming, MAJ Neil Siebert, CPT (P) James T. Baird, Report of the Special Study Group On the Infantry Fighting Vehicle and the Cavalry Fighting Vehicle (IFV/CFV Special Study Group Report), (Ft. Leavenworth, KS), p 8-19 ; Mr. Gus Fabian (Former Bradley Fighting Vehicle Total System Manager), Telephone interview concerning IFV/CFV Special Study Group Report, October 1987.

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